RECOVER AND RECYCLE RHODIUM FROM SPENT PARTIAL OXIDATION CATALYSTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. Patent Application Serial No. 10/176,224, filed June 20, 2002, and entitled "Recover and Recycle Rhodium From Spent Partial Oxidation Catalysts," which is incorporated herein by reference.

WAL Pat. 6,764,662

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

TECHNICAL FIELD OF THE INVENTION

[0003] This invention relates to spent catalyst compositions for partial oxidation processes. More particularly this invention relates to a method for recovering and recycling rhodium in spent supported partial oxidation catalysts.

BACKGROUND OF THE INVENTION

[0004] The separation and purification of rhodium (Rh) from other precious metals is one of the most difficult and pressing areas in precious metal refining. This situation arises mainly because of the complex solution chemistry in chloride-containing aqueous solutions. The complexes formed by rhodium in these types of solutions are such that modern recovery processes such as solvent extractions (SX), which have been implemented for the recovery of other platinum group metals (PGMs), cannot be easily applied to the recovery of rhodium. Thus far, no industrially acceptable solvent extraction system has been developed for rhodium.

[0005] Rhodium is often used in combination with other PGMs in catalysts. In the life of a catalyst, the catalyst may lose some or all of its activity. A catalyst may deactivate through the accumulation of a layer of carbon deposits, or coke. Coke accumulation typically occurs throughout the catalyst pore systems and physically blocks access to active sites. Further, metal agglomeration may occur, which can severely reduce catalyst activity. Still further, poisons (e.g., lead, arsenic, sulfur) may permanently deactivate the catalyst. In many cases, deactivated catalysts are regenerated so that they recover at least part of their initial activity.

[0006] Cycles of deactivation and regeneration may occur for many years. The catalyst may be regenerated in situ or removed for ex situ regeneration. In one strategy, a fixed bed or slurry bed reactor unit and a regenerator unit are paired in tandem, for simultaneous operation. After